

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Atty. Docket No.: 26068-08D

Anderson

Serial No.: 09/891,064

Art Unit: 1644

Filed: June 25, 2001

Examiner: P. Nolan

Title: Human Occludin, Its Uses and Enhancement of Drug Absorption Using Occludin Inhibitors

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION OF DR. JAMES M. ANDERSON

I, JAMES M. ANDERSON, hereby declare as follows:

1. I am currently Professor and Chair in the Department of Cell and Molecular Physiology, School of Medicine, University of North Carolina at Chapel Hill. I received my M.D. from Harvard Medical School (1983) and my Ph.D. from Harvard University (1979). Previously, I had been involved in research and teaching in Medicine, Physiology and Cell Biology at Yale University from 1988 to 2002 (14 years). I am a member of the American Society for Cell Biology, American Physiological Society, American Society for Clinical Investigation, American Society for Advancement of Science and a number of other societies set forth in my Curriculum Vitae (C.V.), a copy of which is appended hereto as Exhibit A. I have

authored or co-authored over 62 peer-reviewed publications in addition to invited review articles, book chapters and books. My service on various National Committees, committees at Yale University and Yale Medical School and UNC of Chapel Hill School of Medicine are summarized in the attached C.V.

2. I am actively involved in the research disclosed in, and am named as a co-inventor of the above-identified application and its parent applications, and am therefore well aware of their contents.
3. I have reviewed the above-referenced application and the office action mailed January 23, 2003. I submit this declaration in connection with the office action. More specifically, I submit this declaration in connection with the claim rejections based on "Interspecies Diversity of the Occludin Sequence: cDNA Cloning of Human, Mouse, Dog, and Rat-Kangaroo Homologues," Ando-Akatsuka et al., The Journal of Cell Biology, Vol. 133, No. 1, April 1996, pp. 43-47 (hereinafter referred to as the Ando-Akatsuka publication).
4. The publication date of the Ando-Akatsuka publication was April, 1996. The sequence of human occludin reported in the Ando-Akatsuka publication paper was also available on the Internet through the National Center for Biotechnology Information (NCBI) on February 1, 1996 under accession number U49184.

5. My co-inventors and I isolated and sequenced the cDNA for human occludin and deduced its amino acid sequence at least as early as 1995, which is before the publication of the Ando-Akatsuka publication. Thus, my co-inventors and I had possession of the currently pending claims before the earliest publication date of the Ando-Akatsuka publication.
6. The attached documentation establishes that we isolated and sequenced the cDNA sequence for human occludin at least as early as 1995. This is shown on pages 23, 40, and 78 of Dr. Christina Van Itallie's laboratory notebook, copies of which are attached hereto as Exhibit B. The notebook pages are dated prior to the earliest publication date of the Ando-Akatsuka publication, but the dates have been redacted to maintain the secrecy of the date of my invention.
7. Page 23 of Dr. Christina Van Itallie's laboratory notebook is entitled "Plasmid preps on 1, 5, 7 for sequencing, Northern, etc." Plasmids 1, 5, and 7 contained cDNA sequences of human occludin obtained by screening a human cDNA library. Lines 7 and 8 from the bottom refer to DNA sequencing reactions of clones 1 and 7, which were submitted to the Yale Sequencing Facility for automated sequencing.
8. Ja1OCT7 designates: James Anderson clone 1 of human occludin sequenced by priming the plasmid with the T7 primer (hereinafter "clone 1"). Ja7OCT7 designates: James Anderson clone 7 of human occludin as sequenced by priming the plasmid with the T7 primer (hereinafter "clone 7").

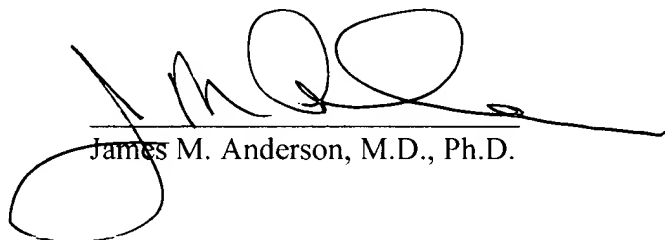
9. Clone 1 encodes the correct full-length human occludin. Clone 7 lacks sequence encoding the N'-terminal 32 amino acid residues. We submitted the sequence of clone 7 in Figure 2 of our U.S. Provisional Application. We recognized that clone 1 contained the correct N'-terminal sequence after release of NCBI-accession number U49184, as acknowledged at the top of page 78 in Dr. Van Itallie's notebook. Clone 1 overlaps clone 7 from amino acid residues 33 to 522 of SEQ. ID. NO. 2. Both clones 1 and 7 code for the extra-cellular loops of interest in the present application. The extra-cellular loops are residues 89 to 138 and residues 196 to 246 of SEQ. ID. NO. 2.
10. We were working with both clones 1 and 7 prior to the earliest publication date of the Ando-Akatsuka publication. By the filing date of our U.S. Provisional Application, we were using clone 7 in our continuing research.
11. Page 40 from Dr. Van Itallie's notebook is also dated prior to the earliest publication date of the Ando-Akatsuka reference. This page is entitled "Make full length ocl clone for expression". As noted, clones 1 and 7 differ at the 5' end of their coding regions. Clone 1 encodes the correct full length human occludin. At the time we simultaneously pursued the possibility that clone 7 might contain the correct 5' end. In the protocol described on page 40, Dr. Van Itallie is ligating the 5' end of clone 7 onto the 3' end of clone 1 at a shared Bgl II site and cloning them into a mammalian expression vector. Page 40 also shows this protocol continued on a later date.

12. We completely identified the sequence of human occludin as presently claimed prior to the earliest publication date of the Ando-Akatsuka publication. Thus, my co-inventors and I invented the subject matter of the present application, as presently claimed, before it was described in the Ando-Akatsuka publication.

13. All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. These statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the above-referenced application or any patent issuing thereon.

Chapel Hill, NC, United States

Date: 6-16-03


James M. Anderson, M.D., Ph.D.

Jam s M. Anderson, Ph.D., M.D.**Personal**

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 E-mail Address: jandersn@med.unc.edu

Present Position

Professor and Chair
 Department of Cell and Molecular Physiology
 The University of North Carolina at Chapel Hill

Education

B.S.	Biology	Yale College, New Haven, CT	1974
Ph.D.	Biology	Harvard University	1979
M.D.		Harvard Medical School	1983
M.S.	Science	Yale University (honorary)	1998

Clinical Experience

Intern/Resident, Yale-New Haven Hospital, New Haven, CT	1983-86
Postdoctoral Fellowship, Hepatology, Yale School of Medicine, New Haven, CT	1986-89
Diplomat, American Board of Internal Medicine	1986 -
Connecticut State Medical License - 027065	1985 -
Attending Physician, Yale-New Haven Hospital Internal Medicine and Hepatology	1988 - 02
Attending Physician, West Haven Veteran's Administration Hospital Internal Medicine and Hepatology	1988 - 02

Professional Experience

Yale School of Medicine	
Assistant Professor of Internal Medicine	1988 - 91
Associate Professor of Internal Medicine and Cell Biology	1991 - 98
Associate Professor (without term)	1996 - 98
Chief, Section of Digestive Diseases	1996 - 02
Professor of Medicine and Cell Biology	1998 - 02
The University of North Carolina at Chapel Hill School of Medicine	
Professor and Chair, Cell and Molecular Physiology	2002 -

Honors and Recognition

Individual NRSA	1986 - 88
Terry Kirgo Memorial Fellowship, American Liver Foundation	1987 - 88
Lucille P. Markey Scholar Award in Biomedical Science	1988 - 94
The Dean's Young Faculty Award, Yale School of Medicine	1991

American Society for Clinical Investigation, elected member	1994 -
Interurban Clinical Club (Boston/NY/New Haven/Phili/Baltimore), elected member	1994 - 02
American Association of Physicians, elected member	1999 -

Professional Affiliations

American Society for the Advancement of Science
 American Association for the Study of Liver Diseases
 American Association of Physicians
 American Gastroenterological Association & Gastroenterology Research Group
 American Physiological Society
 American Society for Cell Biology
 American Society for Clinical Investigation
 Association of Subspecialty Professors
 International Association for the Study of Liver Diseases

Editorial Boards

<i>Gastroenterology</i>	1999 - 04
<i>Journal Clinical Gastroenterology</i>	1999 - 04
Ad Hoc Referee	

Committees and Activities

National Committees

Advisory Board Member	
Harvard Digestive Diseases Research Core Center - (NIH)	1996 -
University of Pennsylvania School of Medicine,	
Center for Studies of Digestive and Liver Diseases - (NIH)	1998 - 03
Research Committee, Am. Gastro. Assoc.	1992 - 96
Research Committee, Am. Assoc. Study Liver Diseases	1996 - 99
Selection Committee, Life Sciences Research Foundation (Princeton, NJ)	1996 - 97
NIH NIGMS Biomedical Research & Research Training Committee	
BRT-A Study Section	1996 - 00
FASEB Research Conference, GI Track VIII, Co-organizer,	2001
Experimental Biology 2001, Symposium Organizer	2001
Ph.D., DVM, MD/PhD Committee, Am Gastro Assoc	2001 - 03
Chair	2003 - 05
Organizer, Special Interest Subgroup Meeting, 14 Dec. 2002	
Annual Meeting of the Am Soc for Cell Biology, San Francisco, CA	2002
Association of Chairs of Departments of Physiology	2003-
Membership & Diversity Council, Am Gastro Assoc	2004-07

Yale University

Biological Sciences Advisory Committee	1998 - 00
Tenure and Appointments Committee for the Biological Sciences	1998 - 00

Yale Medical School

Co-Director, L.P. Markey Physician-Scientist Training Program	1991 - 96
M.D./Ph.D. [MSTP] Selection Committee	1990 - 02
Boyer Center Junior Faculty Program Selection Committee	1994 - 95
Anna Fuller Molecular Oncology Fellowship Selection Committee	1994 - 98
Advisory Board, Yale Critical Technologies Program	1995 - 97
Member, Yale Comprehensive Cancer Center	1995 - 02
Advisory Committee, Center for Cell Imaging - Cell Biology	1996 - 97

Internal Selection Committee, HHMI Investigator Nominees	1996 & 01
Search Committee, Chair of Cellular and Molecular Physiology Department	1998 - 99
Liver Transplantation Steering Committee	1996 - 02
New Research Building Space Allocation Committee	1998 - 02

Yale Department of Internal Medicine

Director, Research Pathway	1993 - 02
Residency Selection Committee	1990 - 02
Space Allocation Committee	1999 - 02
Search Committee, Chief of Medical Oncology	2000 - 01

Yale Division of Digestive Diseases

Chief	1996 - 02
Assoc. Director, Yale Liver Center - (NIH)	1998 - 02
Executive Committee, Yale Liver Center - (NIH)	1993 - 02
Director, Investigative Hepatology Training Grant - (T32, NIH)	1999 - 02

UNC at Chapel Hill School of Medicine

Basic Science Chairs Committee	2002-
Advisory Committee for the School of Medicine	2002-
Lineberger Comprehensive Cancer Center, Member	2002-
Gottschalk Award Nominating Committee	2002-
Scientific Misconduct Case Inquiry Team	2002
Medical-Scientist Training Program, Executive Committee	2002-
Cell & Molecular Biology Training Program (NIH-T32), Executive Committee,	2002-
Associate Director, Center for Gastrointestinal Biology and Disease (NIH-P30)	2003-
Interdisciplinary Biomedical Sciences Graduate Program, Committee Member	2002-
Faculty Salary Equity Committee	2003-

UNC Department of Cell & Molecular Biology

Graduate Committee (Cell & Molecular Physiology), co-Chair	2002-
Faculty Recruitment Committee, Chair	2002-
Director, Weekly Seminar Series	2002-
Research Day, Director	2002-

Postdoctoral Trainees

Yale School of Medicine

		<u>Present Position</u>
Elizabeth Willott, Ph.D.	1988 - 90	Research Faculty, Univ. Arizona
Michael Fallon, M.D.	1989 - 93	Prof. of Medicine, Univ. Alabama - Birmingham
Maria Susana Balda, Ph.D.	1990 - 94	Research Faculty, Univ. London
Barry Slitzky, M.D.	1990 - 92	
David Rimm, M.D., Ph.D.	1990 - 91	Assoc. Prof. of Pathology, Yale
Stuart Levin, M.D.	1992 - 94	
Alan S. Fanning, Ph.D.	1993 - 96	Research Faculty, Yale University
Lynne Lapierre, Ph.D.	1994 - 97	Research Faculty, Cell Biology, Vanderbilt
Zenta Walther, M.D., Ph.D.	1997 - 02	Asst. Prof. of Pathology, YSM
Christoph Rahner, M.D.	1998 - 01	Asst. Prof. Surgery, Yale University
Rolando Medina, Ph.D.	1999 - 00	Biotech Patent Lawyer
Laura Mitic, Ph.D.	2000 - 02	Postdoctoral Associate, UCSF

Graduate Students

Yale University

Alexander Brecher, BS	1994 - 99	Dermatology Resident, New York University
MSTP/Cell Biology		
Laura Mitic, BS	1996 - 00	Postdoctoral Associate, UCSF

Cell Biology		
Danette Daniels, BS	1995 - 99	Postdoctoral Associate, Stanford University
Co-advisor (Alex Brunger)		
Molecular Biology & Biophysics		
Oscar Colegio, BS	2000 -	MSTP/Cell Biology

Invited Research Speaker (selected)

Invited Plenary Speaker, Int. Union of Physiol. Sci., Glasgow, Scotland, 3 Aug. 1993
L.P. Markey Trust Symposium, San Diego, CA, Sept. 1993
SU New York Stony Brook MSTP Program, 11 May 1994
Medical College of GA, Inst. of Molecular Medicine, May 1994
Developmental Biology Center, UC Irvine, 13 June 1994
R.W. Johnson Medical School, Cell and Dev. Biol., New Jersey, Feb. 1995
University Speaker, Leicester, England, 4 April 1995
Germany GI Society, State of the Art, Berlin, 16 Sept. 1995
Iberoamerican Soc. Cell Biol., Mexico City, 7 Oct. 1995
Keystone Symposium, Intercellular Junctions, March 1996
Boehringer Ingelheim Fonds International Conference, Titisee, Germany
State-of-the-Art, "Cell Junctions and Disease," Oct. 1996
University of Colorado, Denver, Physiology Dept., Nov. 21, 1996
Harvard Medical School, MGH Gastroenterology Section, Boston, MA, Feb. 25, 1997
Invited Speaker, Falk Symposium, Freiburg, Germany, 1 Oct. 1997
Invited Plenary Speaker, American Society Nephrology, San Antonio, TX, 4 Nov. 1997
Symposium Speaker, MGH/Harvard, Mucosal Immunology, Boston, MA, 11 Nov. 1997
Invited Speaker, Center for the Study of Basic Mechanisms of Inflammatory Bowel Disease,
MGH/Harvard, Nov. 14-15, 1997
Biochemistry Department, UT San Antonio, 6 March 1998
3rd Intl. Malpighi Symposium, Monterey, CA, April 1998
Invited Plenary Speaker, Annual FASEB Meeting, Washington, DC, April 1998
Symposium Speaker, AGA/Digestive Disease Week, New Orleans, LA, 19 May 1998
Medical Grand Rounds, Hospital of St. Raphael's, New Haven, CT, 2 June 1998
Invited Speaker, Falk Symposium, Titisee, Germany, 17 Oct. 1998
GI Grand Rounds, MGH/Harvard Medical School, 2 Feb. 1999
FASEB, GI Tract, Copper Mt., 25-30 July 1999
Physiology Dept. University of Texas Southwestern, Sept. 27, 1999
ASCB MAGUK Symposium, Washington, DC, 11 Dec. 1999
Keystone Symposium Chair, Mucosal Immunity, Taos, NM, 18-22 Jan. 2000
Keystone Symposium, Intercellular Junctions, Feb. 2000
Soc. Pediatric Pathology, New Orleans, LA, 25 Mar. 2000
Yale Cell Biology Department Retreat, 7 April 2000
Research Lecture, Jichi Medical School, Utsunomiya, Japan, 7 Sept. 2000
4th US-Japan GI Meeting Program, Tokyo, Japan, 8 Sept. 2000
Asahikawa GI and Hepatology Symposium, Asahikawa Medical College, Otaru, Japan, 10 Sept. 2000
GI Symposium, Kyoto Medical School, Kyoto, Japan, 12 Sept. 2000
10th Annual Arias Symposium, American Liver Foundation, Boston, MA, 25 Oct. 2000
Medicine Department, Mt. Sinai School of Medicine, 16 Jan. 2001
Experimental Biology 2001 - Symposium Chair, Tight Junction: Convergence of Molecular and Physiologic
Insights, Orlando, FL, 1 April 2001
Gordon Research Conference - Cell Contact, Andover, NH, June 2001
AstraZeneca - Mucosal Defense Mechanisms, Gothenburg, Sweden, June 2001
FASEB Research Conference, GI Track VIII (co-organizer), August 2001
Cell & Molecular Physiology Dept., UNC-Chapel Hill, 25 Sept. 2001
Yale Pathology Department Grand Rounds, 18 Oct. 2001
Canadian Gastroenterology Society, Montreal, 3 Feb. 2002

MD-PhD Retreat, UNC at Chapel Hill, Wilmington NC, 3 Aug. 2002
European Intestinal Transport Group, Egmond ann Zee, NL, 28 Sept. 2002
Dept. of Physiology, Northwestern School of Medicine, Chicago, IL, 10 Oct. 2002
Dept. of Cell Biology, UNC, Chapel Hill, 23 Oct. 2002.
Am. Soc. for Nephrology. Ann. Meeting, symposium speaker, 3 Nov. 2002
Dept. of Pharmacology, UNC-Chapel Hill, Chapel Hill, NC, 3 Dec. 2002
USC School of Medicine, Pulmonary Division, 13 Dec. 2002
Co-organizer, ASCB meeting on Tight Junction, San Francisco, CA 14 Dec. 2002
NIH-NIEHS, Chapel Hill, NC, 8 Jan. 2003
Transatlantic Airway Conference, Key Biscayne, FL, 15 Jan. 2003
Annual Higuchi Research Seminar, Univ. Kansas Pharmaceutical Chemistry, 4 May 2003

Scientific Advisory Boards

Scientific Advisory Board, WEST Pharmaceutical Services, Lionville, PA, 1994 - present
GI Transport Advisory Board, ALZA Corporation (J&J), Mountainview, CA, 2000
Scientific Advisory Board, Natestech, Seattle, WA, 2003-present

Extramural Grants

Ongoing Research Support

RO1 DK 45134 Anderson (PI)

04/01/03 – 03/31/08

NIH/NIDDK

Molecular Analysis of Tight Junctions in Liver and Gut.

The goal of this grant is to understand the molecular basis for control of paracellular transport in normal and diseased epithelia with the long-term goal of manipulating these properties for therapeutic purposes.

Role: PI

PO1 DK055389 Morrow (PI)

12/01/98 - 11/30/03

NIH/NIDDK

Cell and Molecular Pathobiology of Renal Disease.

The overall goals of this project are to understand epithelial cell organization including membrane trafficking, myosin motor and angiogenesis in the kidney and in response to injury. Subproject 4 focuses on the response of tight junctions to reversible ischemia.

Role: PI on Subproject 4

RO1 DK Anderson (PI)

04/01/03 – 03/31/08

NIH/NIDDK

ZO-1 and cytoplasmic scaffolding at the tight junction.

Completed Funding (last 3 years)

P30 DK34989 Boyer (PI)

07/01/99 - 06/30/04

NIH/NIDDK

Digestive Diseases Research Core - Yale Liver Center

Role: Associate Director of Center and Director of the Molecular Biology Core

T32 DK07356 Anderson (PI)

07/01/99 - 06/30/04

NIH/NIDDK

Investigative Training in Hepatology

Role: Director

PO1 CA66263 Bryant (PI, UC Irvine)

07/01/95 - 06/30/00

James M. Anderson, Ph.D., M.D.

NCI

Membrane Associated Guanylate Kinase Homologs

The goals of this grant are to study a class of proteins called MAGUKs, which are important in organizing membrane domains. A range of methods are used including genetics (*Drosophila*, *C. elegans* and mice), Cell Biology and x-ray crystallography to define the protein structure, interactions and function. Project 4 is focused on the mammalian MAGUKs CASK, hDlg and ZO-1. Much of the work focused on the biology of PDZ domains and work on ZO-1 is focused on its intramolecular domain interactions and how these regulate binding to other proteins.

Role: PI on Subproject 4

Bibliography

Original Peer-Reviewed Articles:

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2. Anderson, J.M. 1979. Structural studies on human spectrin. *J Biol Chem* **254**:939-944.
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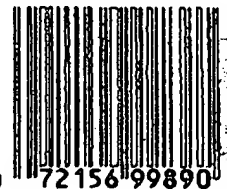
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Plasmid preps of 1, 5, 7 for sequencing, Northern etc

OD 5 μ l / 1000 μ l

	260	280		
#1	0.320	0.178	1.8	2.56 μ g/ μ l
5	0.496	0.276	1.8	7.0 μ g/ μ l
7	0.328	0.189	1.7	2.6 μ g/ μ l

set up digests - dig (for seq) more for insert prep

1A

#1, 5, 7 1 μ l plasmid
9 μ l mix

mix - 4 μ l 10x RI buffer
0.4 μ l BSA
3 μ l RI
28.6 μ l H₂O

also - 20 μ l for insert prep

#1 8 μ l plasmid
10 μ l 10x enzyme
1 μ l BSA
3 μ l Eco RI
78 μ l H₂O

#2 8 μ l plasmid
10 μ l 10x buffer
1 μ l BSA
3 μ l Bam HI
3 μ l Hinc II
75 μ l H₂O

#5 5 μ l plasmid
10 μ l 10x buffer
1 μ l BSA
3 μ l Hinc II
81 μ l H₂O

taken over for sequencing

#5 - TB, T9

#1 - 18684 (3.2 μ M) 18686

#7 - 18689, 18685 1

18684 - antisense mapping #2

18685 - sense 348-365 J670CT7

18686 - 344-361 J610CT7

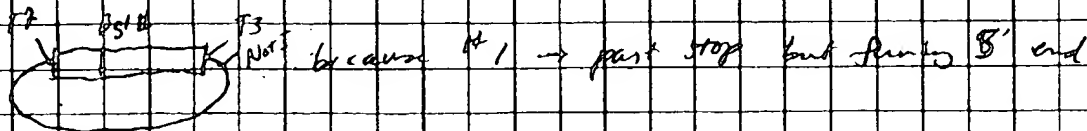
cut on N.

P:C extract

THU

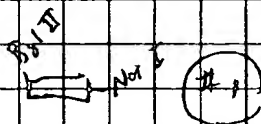
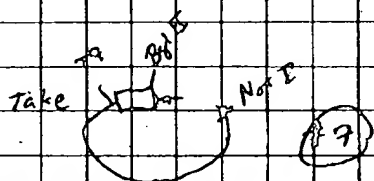
Make full length rec clone for expression

Plan: cut clone I, 7 w Bgl II, Not I

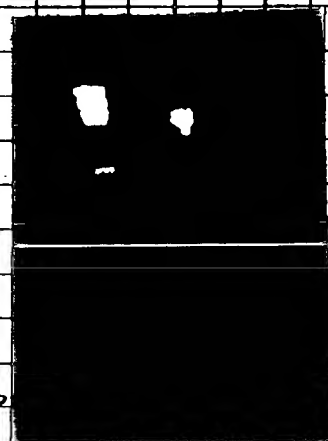
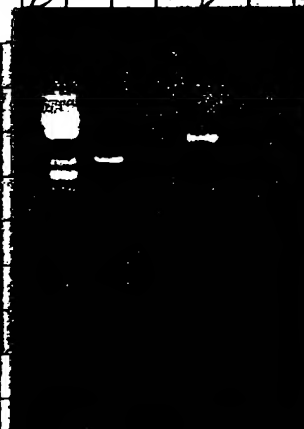
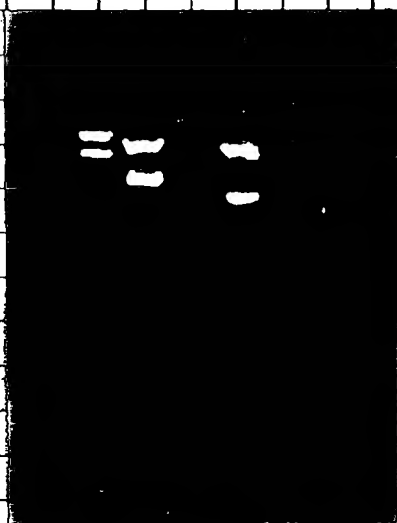


clone 1 2.6 ug/ml
7

cut 10 ug of clone #7
20 ug of clone #1



#7 1
cut ✓ 4 µl plasmid ✓ 8 µl plasmid
10 µl 10x 3 10 µl 10x 3
✓ 1 µl BSA ✓ 1 µl BSA
2 ml Bgl II 2 ml Bgl II
2 ml Not I 2 ml Not I
✓ 81 µl H₂O ✓ 77 µl H₂O



gene clean #1, 7 - run 1 µl (one of 10) on gel

results - #1 - small bands good
#7 - small amount high cut?

double band at around 9 kb - 0.9 kb
recut #7 w Not I/

Not I/Bgl II
H₂O

DN. #7

①

②

③

④

4 µl plasmid

5

CELLMOLEC-PHYSIOLOGY

MAY 14 2003 1:12 PM

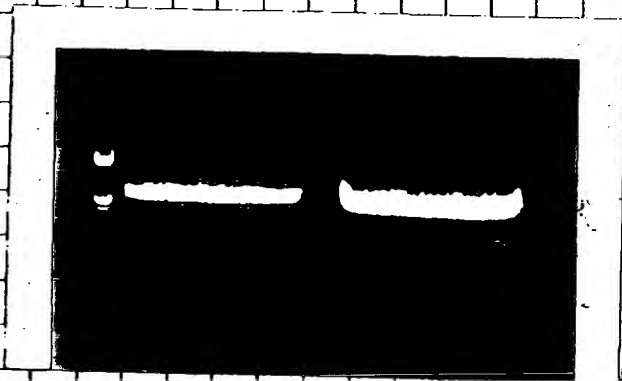
Revelation! human occludin sequence published and
have been working w wrong clone - clone #1 is correct
so put it into pCBG vector (Kpn/Xba)

cut clone #1 w Kpn
- 10 μ l #1
10 μ l 10x buffer #1
10 μ l BSA
3 μ l enzyme
67 μ l H₂O

cut pCBG w Xba I
clone #2, w Spe I
start at 12:58 PM - 2:30
run on gel for gene clean

Kpn I/Spe I insert is 2.45
plasmid is 2.9
pCBG - 6.2

gene clean



Post run -
2 μ l gene
2 μ l 10x
2 μ l Pvu
14 μ l H₂O
3' 3' 2'
20' 15' C
take 2
#2, 3

ligation

①
3 μ l insert
1 μ l vector
2 μ l 10x ligase
1 μ l ligase
17 μ l H₂O

②
3 μ l insert
2 μ l Pvu vector
2 μ l 10x ligase
1 μ l ligase
13 μ l H₂O

③
3 μ l Pvu vector
2 μ l 10x ligase
1 μ l ligase
16 μ l H₂O

④
1 μ l vector
2 μ l 10x ligase
1 μ l ligase
16 μ l H₂O

Transform
4 μ l Li
100 μ l cells
30' 10'

FROM ADMIN

NO 994

CELL MOLEC-physiology

MAY 19 2003 4:11 PM

2.2